

V.3.3-NOMSNG NO MISSING VALUES TIME SERIES OPERATION

Identifier: NOMSNG

Application: All programs

Description: This Operation takes any time series with missing data and generates a new time series with no missing values.

The most common use of this Operation would be to create a no-missing value time series from observations of canal or trans-mountain diversion discharge.

The following options can be used to fill in missing data occurring at the beginning, in the middle and at the end of the input time series:

1. simple linear interpolation between two known observations
2. retain last value (for example, to extend a time series to the end of a forecast run)
3. recession of last value by user-specified recession constant

The following rules and options apply to this Operation:

1. The Operation requires an input time series allowing missing data.
2. The Operation requires an output time series which doesn't allow missing data.
3. The input time series and output time series must have the same time step.
4. The output time series must have the same dimensions and units as the input time series.
5. The time series must have only one value for each time interval.

Allowable Data Time Intervals: 1, 2, 3, 4, 6, 8, 12 and 24 hours

Time Series Used: Time series used in this Operation are as follows:

General Type	Dimn	Units	Use	Required	Form of Output T.S.	Data Time Interval	Missing Values Allowed
Input time series <u>1/</u>	any	<u>2/</u>	I	yes	n/a	any	yes

Output time        same    same    0    yes    replace    same    no  
series 3/

1/ Time series from which no missing value time series is to be created.

2/ Standard units for data type.

3/ Time series containing no missing values. The data dimensions, units and data time interval are the same as the input time series.

Input Summary: The card input for this Operation is as follows:

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
1	3-10	2X,2A4	Internal identifier for the input time series from which the no missing value time series is generated
	12-15	1X,A4	Data type code for input time series
	19-20	3X,I2	Time interval in hours for the input and output time series
	23-30	2X,2A4	Internal identifier for the output time series containing no missing values
	32-35	1X,A4	Data type code for the output time series
	40	4X,I1	Interpolation option for filling in missing values: 0 = retain last value (in this case the carry over value) 1 = linear interpolation between valid observations
	42-45	1X,F4.2	Recession coefficient for 24 hour period. Used to recede the last valid observation in the input time series. Also used for extending time series backwards to fill in missing values in the beginning of a time series. A value of 1.0 will retain the last value in the time series.
	50	4X,I1	Source of initial carry over value: 0 = default value of -999.0 1 = user supplied value

Card 2 is required only if a value of 1 is specified in column 50 of card 1.

<u>Card</u>	<u>Format</u>	<u>Columns</u>	<u>Contents</u>
2	3-12	2X,F10.2	User supplied carryover value
	14-15	1X,I2	Number of time steps that the carry over time precedes the start time of the forecast run

Sample Input and Output: Sample input is shown in Figure 1. Sample output from the parameter print routine is shown in Figure 2. There is no execution routine output.

Error and Warning Messages: The error and warning messages generated by this Operation and the corrective action to take when they occur are as follows:

A. Messages that can occur during setup:

1. **\*\*ERROR\*\*** INPUT AND NO-MISSING VALUE TIME SERIES DO NOT HAVE THE SAME UNITS (XXXX and XXXX).

Action: Make sure both time series have the same units and dimensions.

2. **\*\* ERROR\*\*** THE INPUT TIME SERIES ALLOWS MISSING DATA. THE OUTPUT TIME SERIES CANNOT HAVE MISSING DATA.

Action: Correct the specification of the output time series.

3. **\*\*ERROR\*\*** A RECESSION CONSTANT OF 0 (ZERO) IS NOT ALLOWED. VALID VALUES ARE GREATER THAN 0.0 AND LESS THAN OR EQUAL TO 1.0.

Carryover Transfer Rules:

If time series identifier, data type and time interval are the same, old carryover can be used.

If time series identifier and datatype are the same but the time interval is different:

CO(1) remains the same

CO(2) is modified as follows:

$$C_{\text{new}}(2) = C_{\text{old}}(2) * \text{time\_interval\_old} / \text{time\_interval\_new}$$

Computed values of C<sub>new</sub>(2) which are less than one are set equal to one.

If the time series identifier or data type is different, new carryover values are input from the PIN routine.

Punched Card Limitations:

The format of the punched card images is the same as that described in the Input Summary.

No checks for the validity of the parameters or carry over data are made.

Figure 1. Sample Card Input For Operation NOMSNG

```

          - Column -
      5   10   15   20   25   30   35   40   45   50   55   60   65   70   75   80
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
STAGE-Q      TWTWE
TWIN LAKES DIVERSION  TWTWE              1
  TWTWE      STG      1  TWTWE      QIN      1
NOMSNG      TWTWE
  TWTWE      QIN      1  TWTWE      SQIN      0  0.6    0
CHANGE-T    TWTWE
  TWTWE      SQIN      1  TWTWE      SQIN      6
  
```

Figure 2. Sample Output From Operation NOMSNG Print Parameter Routine

```

*****
NOMSNG  OPERATION      NAME=TWTWE      PREVIOUS NAME=
*****

NO MISSING VALUE TIME SERIES OPERATION PRINT PARAMETER ROUTINE

INPUT TIME SERIES I.D.= TWTWE      TYPE= QIN      TIME INTERVAL= 1 HOURS).
NO MISSING TIME SERIES (I.D.= TWTWE      TYPE=SQIN      TIME INTERVAL= 1 HOURS).
OPTION FOR DEFAULT INITIAL CARRYOVER SELECTED
OPTION TO RETAIN LAST VALUE SELECTED
RECESSION COEFFICIENT IS .60 FOR EXTENDING TIME SERIES FORWARDS OR BACKWARDS
  
```

Figure 3. Sample Output From Operation NOMSNG Print Carryover Routine

```

*****
*
*          CARRYOVER DATE TO BE PRINTED = 04/01/1993-12 Z          *
*
*****

NOMSNG  OPERATION      NAME=TWTWE

NO-MSNG OPERATION PRINT CARRYOVER ROUTINE

NO MSNG TS CARRYOVER=      .29      UNITS: CMS
THIS IS THE VALUE OF TIME SERIES (I.D.= TWTWE      TYPE= QIN      DT= 1 HOURS      0 TIME STEPS BEFORE RUN START

*****
*
*          CARRYOVER DATE TO BE PRINTED = 04/02/1993-12 Z          *
*
*****

NOMSNG  OPERATION      NAME=TWTWE

NO-MSNG OPERATION PRINT CARRYOVER ROUTINE

NO MSNG TS CARRYOVER=      .48      UNITS: CMS
THIS IS THE VALUE OF TIME SERIES (I.D.= TWTWE      TYPE= QIN      DT= 1 HOURS      1 TIME STEPS BEFORE RUN START
  
```